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Promoting the Social and Cognitive Competence of Children with Autism: Interventions at School

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Addressing the needs of children with autism in the school context is an essential component of facilitating the success of these students. This article provides an overview of scientifically based and promising interventions that may be used to promote the social and cognitive competence of children with autism, focusing on the research base of these particular strategies. Brief descriptions and outcome data are provided for: a) Discrete Trial Training (DTT), b) Pivotal Response Treatment (PRT), c) Learning Experiences: An Alternative Program for Preschoolers and Parents (LEAP), d) The Picture Exchange Communication System (PECS), e) Incidental teaching, and f) The Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH). This article aims to bring science to practice through providing school psychologists and other educational professionals with a primer for selecting evidence-based approaches to address the needs of children with autism.

KEYWORDS: Autism, Social, Behavioral, Academic, Cognitive, Intervention, School

A review of prevalence studies published since 2000 indicated that recent studies provide converging evidence of approximately 60 per 10,000 children diagnosed with autism, a notable increase from previous estimates of 10 per 10,000 (Fombonne, 2003; 2005). Recognizing national and state-wide increases in the prevalence of individuals identified with autism during the past decade (Tidmarsh & Volkmar, 2003), it is important that school psychologists and other educational professionals are prepared to address the needs of these students (Williams, Johnson, & Sukhodolsky, 2005). Moreover, it is clear that "school professionals play a critical role in the development, monitoring, and implementation of successful intervention programs for students with autism" (Brock, Jimerson, & Hansen, 2006, p. 88).

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Autism is characterized by significant delays in communication and social interaction and the existence of repetitive and stereotyped interests (American Psychiatric Association, 2000). For over 60 years, a variety of treatments have been offered to address the neurological, behavioral, and developmental challenges associated with autism. While the cause(s) of autism remains elusive, numerous interventions have been developed in efforts to remediate symptoms of autism.

Published outcomes studies describing positive results from many of these intervention strategies can be found in the literature. However, it is imperative that school psychologists are aware of the methodological considerations related to previous studies, as well as the efficacy of particular intervention strategies. In the field of autism, treatments with little or no empirical support are sometimes promoted as all-encompassing or curative. School psychologists and other mental health professionals can help restore a focus on the empirical basis of interventions – as well as the need for individualized intervention plans. Given that the severity of behaviors (often classified as severe, moderate or mild, or low- and high-functioning) varies from child to child, intervention plans should be developed based on individualized assessment by a multidisciplinary team. Assessment, as an important first step of the process is discussed in further detail by Brock, Jimerson, and Hansen (2006).

Additionally, while professionals often select various elements from diverse intervention approaches to develop a single intervention plan, there is some evidence that such an eclectic practice may be associated with fewer gains as opposed to implementing one comprehensive evidence-based behavior analytic strategy (Howard, Sparkman, Cohen, Green, & Stanislaw, 2005). Further study is needed to determine potential usefulness of various eclectic approaches, but as it stands, caution is warranted when considering eclectic treatment. Another important consideration involves the fidelity with which an intervention approach is implemented. Outcomes of even the most empirically supported intervention strategies will be contingent on treatment fidelity of the program's implementation. As such, it is recommended that all intervention agents receive the necessary training to implement the chosen strategies, and that ongoing assessment of fidelity of implementation be conducted.

While there is no single intervention that has been identified to address the needs of all children with autism, there is growing consensus regarding the key characteristics of effective intervention programs (National Research Council, 2001). The emphasis is on providing appropriate services as early as possible, with key characteristics including: (1) Systematically planned and developmentally appropriate services targeting identified objectives should be provided at least 25 hours a week, 12 months a year; (2) Objectives must be measurable, observable, and monitored; (3) Interventions will generally emphasize functional communication, cognitive development, social skill instruction, and play skills. Key components to consider when developing comprehensive intervention plans for children with autism include: a) supportive and structured learning environments, b) family involvement, c) early intervention, d) specialized curricula focusing on communication and social interaction, e) integration with typical peers, f) functional approach to problem behaviors, g) planned transitions between preschool and kindergarten/first grade, h) individualization of support service, i) systematic carefully planned instruction, j) intensity of engagement, and k) developmentally appropriate practices (Iovannone, Dunlap, Huber, & Kincaid, 2003).

Students with autism are increasingly included in general education settings with typically developing peers (Williams, Johnson, & Sukhodolsky, 2005). Indeed, given the importance of typical peer models as well as the effectiveness and efficiency of natural environment training, this has been viewed by most education professionals as a positive trend. It is important to note, however, that successful inclusion requires individualized services and supports. Without these appropriate supports in place, the demands of the general education classroom could result in students with autism experiencing a variety of behavior problems and poor academic achievement. Hence, developing comprehensive school-based interventions that incorporate typical peers and promote the social and cognitive competence of students with autism is paramount.

This manuscript focuses on three intervention approaches that have been described as "scientifically based practice," as well as several approaches described as "promising practice" (Simpson, 2005). These classifications are based upon outcome studies considered methodologically strong for this field of study, including single-subject design (Simpson, 2005). Brief descriptions of the following intervention approaches, including outcome studies, will be provided for the three following "scientifically based practices:" a)

Discrete Trial Training (DTT), b) Pivotal Response Treatment (PRT), and c) Learning Experiences: An Alternative Program for Preschoolers and Parents (LEAP). Brief descriptions of the following three "promising practice" intervention approaches, including outcome studies, will be provided: d) The Picture Exchange Communication System (PECS), f) Incidental teaching, and e) The Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH). See Table 1 for a summary of the central tenets and relevant research for each intervention approach.

TABLE 1

Summary of Scientifically Based and Promising Practices in Autism Intervention

STRATEGY	CENTRAL TENETS	DOCUMENTED POSITIVE OUTCOMES	RELEVANT RESEARCH
Scientifically based autism interventions:			
Discrete Trial Training (DTT)	One-to-one intervention, short and clear instructions, carefully planned prompts and fading of prompts, and immediate reinforcement for correct responses. Foundational in the provision of applied behavior analysis services.	Communication/language Social/play Cognitive/academic	Anderson, Avery, DiPietro, Edwards, & Christian (1987) Lovaas (1987) Birnbrauer & Leach (1993) McEachin, Smith, & Lovaas (1993) Smith, Eikeseth, Klevstrand, & Lovaas (1997) Sheinkopf & Seigel (1998) Smith, Groen, & Wynn (2000) Cohen, Amerine-Dickens, & Smith (2006)
Pivotal Response Treatment (PRT)	Focus on natural context, parent involvement, and early intervention in targeting pivotal areas to promote collateral change. Pivotal areas that have been identified include: motivation, self-initiations, responsivity to multiple cues, and self-management.	Communication/language Social/play Cognitive/academic	Koegel, Koegel, & Surratt (1992) Pierce & Schreibman (1995, 1997) Koegel, Camarata, Valdez-Menchaca, & Koegel, (1998) Koegel, Harrower, and Koegel (1999) Koegel, Koegel, Frea, & Green-Hopkins (2003) Baker-Ericzen, Stahmer, & Burns (2007)
Learning Experiences: An Alternative Program for Preschoolers and Parents (LEAP)	Inclusive preschool setting; scaffolded observational learning; training of teachers, parents, and peers. Additional key features: individualized and creative curricula, data-driven maximizing opportunities to respond.	Communication/language Social/play Cognitive/academic	Goldstein & Wickstrom (1986) Goldstein & Ferrell (1987) Schopler, Reichler, & Renner (1988) Strain, Kohler, & Goldstein (1996) Strain & Hoyson (2000)
Promising practices in autism intervention:			
The Picture Exchange Communication System (PECS)	Provides augmentative communication system for children with delayed verbal skills. Focus on teaching children to initiate requests by exchanging symbols for desired objects and activities.	Communication/language Social/play	Bondy & Frost (1994) Schwartz, Garfinkle, & Bauer (1998) Charlop-Christy, Carpenter, Le, LeBlanc & Kellet (2002) Ganz & Simpson (2004)
Incidental teaching	Classroom environments arranged as "zones" to create structured learning opportunities for particular skills; teachers use environmental arrangements to elicit child initiations; additional one-to-one instruction on skills.	Communication/language Social/play Cognitive/academic	McGee, Krantz, Mason, & McClannahan (1983) McGee, Krantz, & McClannahan (1985) McGee, Krantz, & McClannahan (1986) Haring, Neetz, Lovinger, Peck, & Semmel (1987) McGee, Almeida, Sulzer-Azaroff, & Feldman (1992) Miranda-Linne & Melin (1992) McGee, Morrier, & Daly (1999)
The Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH)	Focus on structured classroom teaching and skill enhancement to improve school success. Additional focus on individualization of treatment, parent collaboration, and improving adaptive functioning.	Social/play Cognitive/academic	Ozonoff & Cathcart (1998) Panerai, Ferrante, & Zingale (2002) Van Bourgondien, Reichle, & Schopler (2003) Hume & Odom (2007)

By possessing knowledge of various scientifically based and promising practices for students with autism, school psychologists can help parents and educators in the often overwhelming task of selecting empirically and socially valid resources. This synthesis provides an overview of a handful of school-based interventions for children with autism, with a focus on the evidence base of these approaches. School psychologists aiming to implement a particular intervention approach are encouraged to obtain additional resources and training in order to implement the selected approach with fidelity.

SCIENTIFICALLY BASED PRACTICE

The following three intervention strategies (i.e., DTT, PRT, and LEAP) are presented under the category of scientifically based practice (Simpson, 2005). These approaches are supported by a rigorous empirical base and could likely provide a program of effective techniques for working with students with autism. It should be noted that applied behavior analysis is also considered a scientifically based practice (Simpson, 2005) but is not discussed at length in this manuscript because several of the other intervention approaches presented in this paper draw heavily from principles of applied behavior analysis. Although the treatment approaches in this section have demonstrated empirical support, it is important to remember the essential responsibility for school psychologists to consider contextual influences, such as each student's individual strengths, needs, and resources, when selecting an intervention approach.

Discrete Trial Training

Beginning in the 1960s, early behavioral studies applied operant conditioning to address behavioral challenges in children with autism (Lovaas & Smith, 2003). Generally, these studies were conducted in highly structured environments with few distractions, and numerous discrete trials were utilized to influence individual target behaviors. The importance of traditional behavioral approaches is that they demonstrated systematic gains for children with autism, and thus, are the basis for many current behavioral approaches that have emerged (National Research Council, 2001).

Discrete Trial Training (DTT) emerged following many years of research in applied behavior analysis. The UCLA Young Autism Project (YAP) appears to be among the most extensively studied program of early intensive behavioral intervention (Lovaas & Smith, 2003). Basic tenets of DTT include one-to-one intervention, short and clear instructions, carefully planned prompts and fading of prompts, and immediate reinforcement for correct responses (Lovaas & Smith, 2003). Today, many models of intervention for children with autism draw extensively from DTT (e.g., Alpine Learning Group, Princeton Child Development Institute), and there are over 10 sites throughout the United States and at least two in Europe that are implementing the UCLA model (Smith, Donahoe, & Davis, 2001).

In the YAP, children with autism receive approximately 40 intervention hours per week for approximately three years (Smith, Donahoe, & Davis, 2001). Although there is variability in the rate of progress across children, intervention generally moves through five stages of treatment (Lovaas & Smith, 2003; Smith, Donahoe, & Davis, 2001). The goals within each stage increase in sophistication and complexity. In Stage 1 (Establishing a Teaching Relationship), discrete trials are used to teach one-step instructions to reduce disruptive behaviors. In Stage 2 (Teaching Foundational Skills), discrete trials are used to teach imitation of motor actions, identification of objects, matching, self-help skills, toy play, and discrimination between different instructions. Beginning in Stage 3 (Beginning Communication), intervention addresses expressive language through verbal imitation of speech sounds and labeling of objects, as well as identification of actions and pictures, and expansion of daily living and play skills. Communication skills continue to be expanded in Stage 4 (Expanding Communication and Beginning Peer Interaction) and Stage 5 (Advanced Communication and Adjusting to School) with a particular focus on teaching in dyads using typically developing peers and in inclusive pre-school classrooms, respectively. Parents work alongside the therapist in the beginning stages of intervention at the UCLA YAP, and parents also work to implement incidental teaching procedures in which they set up opportunities to further skill development in their child's daily life (Lovaas & Smith, 2003).

DTT Outcome Data

Communication/language. In an evaluation of a home-based DTT intervention (15-25 hours per week), Anderson and colleagues (1987) found language and communication gains for 1_ to 5 year-old children with autism after one year of treatment. Smith and colleagues (1997) demonstrated gains in expressive speech for preschoolers with comorbid autism and severe mental retardation who had received intensive home- and community-based DTT (30 hours per week) as compared to less intensive DTT (10 or less hours per week), although differential behavioral improvements were not found.

Social/play. Anderson and colleagues (1987) found that children with autism who participated in a home-based DTT intervention achieved higher social age scores on the Vineland Social Maturity or Adaptive Behavior Scales after one year of treatment. Cohen and colleagues (2006) conducted a replication study of the UCLA model and found that preschoolers with autism who received intensive treatment (35-40 hours per week) had higher adaptive behavior scores after three years of treatment than control participants who received less intensive services—although significant differences between groups were not found for language comprehension or nonverbal skills.

Cognitive/academic. In a seminal yet controversial study, Lovaas (1987) reported that 47% of children with autism who received 40 or more hours per week of one-to-one DTT for two or more years achieved normal educational and intellectual functioning. McEachin, Smith, & Lovaas (1993) reported that these children maintained treatment gains in a follow-up study. Additionally, a number of replication studies have been published in peer-reviewed journals (Anderson et al., 1987; Birnbrauer & Leach, 1993; Cohen, Amerine-Dickens, & Smith, 2006; Sheinkopf & Seigel, 1998, Smith, Groen, & Wynn, 2000), further reporting impressive child outcomes (National Research Council, 2001). Lovaas (1987) reported that children with autism who received DTT experienced less restrictive educational outcomes. Anderson and colleagues (1987) had one participant at the beginning of their study already involved in a partially inclusive school placement, and they had several participants who were partially integrated at follow-up of their study. However, none of the children were involved in a fully inclusive classroom setting. Cohen and colleagues (2006) reported that higher numbers of children who had received DTT were fully or partially included in regular education following intervention, as compared to control participants.

Limitations and Conclusions. DTT has provided a valuable foundation for the provision of applied behavior analysis services for children with autism. However, critics have pointed out concerns with the body of research on DTT, including methodological limitations with respect to participant selection and outcome measures (Gresham & MacMillan, 1997, 1998). Selection bias problems have not been eliminated in recent studies of DTT (e.g., Cohen et al., 2006). Other issues that have been raised include the lack of spontaneity and generalization of DTT treatment gains (Gresham & MacMillan, 1998) as well as the cost and time inefficiency of treating individual target behaviors (Lovaas, 1977; Lovaas, Koegel, Simmons, & Long, 1973). Another consideration in using DTT in the schools is that the one-to-one format may limit treatment implementation in natural environments such as inclusive classrooms with typical peers. Additionally, Steege and colleagues (2007) caution against using school-based DTT programs for students with autism without providing the necessary amount of hours for a successful intervention. These authors draw attention to the importance of analyzing behaviors functionally and considering the influence of intervention on multiple domains, including the social domain.

While DTT is a form of applied behavior analysis (ABA), it is important to note that DTT and ABA are not synonymous. These terms are often erroneously used interchangeably, which could potentially turn schools away from using an evidence-based ABA program if they do not wish to use DTT. Thus, it is important that mental health professionals are able to provide information to educators regarding the difference between DTT and other ABA techniques.

Pivotal Response Treatment

Pivotal Response Treatment (PRT) is a service delivery model based upon applied behavior analysis that focuses on the child's natural context, parent involvement, and early intervention in order to provide

comprehensive services to children with autism (Koegel & Koegel, 2006; Koegel, Openden, Fredeen, & Koegel, 2006). Services are often delivered across settings (e.g., home, school, community), with a goal of delivering intervention in inclusive settings. Intervention efforts are focused on targeting pivotal areas to promote collateral changes in generalized areas of functioning (Koegel et al., 2006; Koegel, Koegel, & Carter, 1999; Koegel, Koegel, Harrower, & Carter, 1999). For instance, focusing on child motivation in teaching first words by pairing speaking opportunities with contingent natural reinforcers can improve expressive language and also facilitate additional gains in other areas of development. Pivotal areas that have been identified include motivation, self-initiations, responsivity to multiple cues, and self-management (Koegel, Koegel, Harrower, et al., 1999; Koegel, Koegel, & Carter, 1999).

Motivation. The pivotal area of motivation involves addressing learned helplessness in children with autism by including motivational variables into behavioral interventions. Motivational procedures include child choice, natural reinforcers, interspersing of maintenance trials, and reinforcement of attempts to respond (Koegel, Koegel, Harrower et al., 1999). Children can choose what toys and materials are used, and there is a focus on following the child's lead to maintain interest and attention. Natural reinforcers are directly related to the task such that the child is reinforced within the relevant context rather than given an arbitrary reinforcer after completing a targeted behavior. For instance, if a classroom goal for a child is to use verbal requests to gain access to toys or other desired materials, the natural reinforcer for the desired behavior (i.e., verbal request) would be access to the toy, rather than an unrelated reward such as a piece of candy. Interspersing maintenance trials involves incorporating difficult acquisition tasks with easier tasks that the child has already mastered (e.g., when teaching new vocabulary words, lessons might be integrated to include new words in addition to words the student has already mastered). Finally, reinforcing attempts is advocated to help children avoid giving up after repeated failures.

Self-initiations. Self-initiations are spontaneous verbal or nonverbal interactions generated by the child that result in social interaction or influence how an interaction occurs (Koegel, Koegel, Harrower et al., 1999). Early self-initiations have been associated with favorable outcomes for children with autism (Koegel, Koegel, Shoshan, & McNerney, 1999) and can help open up a child's exposure to widespread learning opportunities in their environments.

Responsivity to multiple cues. Children with autism may exhibit stimulus overselectivity, which refers to a sort of "tunnel vision" in which a child may focus on one aspect of the environment around them while ignoring other aspects (Lovaas, Schreibman, Koegel, & Rehm, 1971). Teaching children with autism to respond to multiple cues addresses this attentional deficit. Multiple cues are targeted using motivational strategies within the scope of PRT. For instance, a high-functioning child is reinforced for using several components or "cues" when verbally requesting an object (e.g., saying "I want the big red ball," as opposed to simply saying "I want ball" or pointing to indicate which specific ball is desired). A nonverbal child may be reinforced with the toy after successfully carrying out the clinician's request, for instance, to point to the green truck in a context of many different colored trucks. Teaching children with autism to respond to multiple cues in their environments has implications for widespread improvements in social, behavioral, and academic domains (Koegel, Koegel, Harrower et al., 1999).

Self-management. Self-management is a positive behavior support system that can help children with autism monitor, record, and reinforce their behavior independently (Koegel, Harrower, & Koegel, 1999; Koegel, Koegel, Harrower et al., 1999). Self-management encourages independence in children with autism and can be useful in many different learning situations. This strategy can be particularly useful in the school context because it teaches children to function independently in the classroom and rely less on adults.

PRT Outcome Data

Communication/language. Research efforts have demonstrated PRT to be associated with gains in language development. By using natural reinforcement, reinforcement of attempts, and child-chosen reinforcers for language acquisition tasks as part of a PRT intervention, Koegel and colleagues (1992) found greater gains in utterance length, number of words, word attempts, and word approximations in comparison to a discrete trial method that focused on individual target behaviors. Collateral gains were also discovered

as the children receiving PRT engaged in lower rates of disruptive behavior (Koegel, Koegel, & Surratt, 1992). Koegel and colleagues (1992) hypothesized that the focus on the pivotal area of motivation in teaching difficult language acquisition tasks leads to less disruptive behavior. Baker-Ericzen and colleagues (2007) found improvements in the communication skills of 3 to 5 year-olds with autism following a community-implemented 12-week intervention that focused on teaching parents PRT skills. These positive results held true regardless of ethnicity (i.e., white or Latino) but were not found for children over the age of six.

Social/play. Multiple baseline designs have demonstrated the success of school-based peer-implemented PRT interventions targeting the social behaviors of low-functioning 7 to 10 year-olds with autism (Pierce & Schreibman, 1995, 1997). In these studies, students with autism improved in areas such as social initiations, prolonged interactions with peers, increased engagement with peers, and also demonstrated maintenance and some generalization of gains. Baker-Ericzen and colleagues (2007) demonstrated adaptive behavior gains for children with autism. Daily living skills and socialization gains were found for children under the age of six, while gains in socialization were found for children over six. In a study examining verbal initiations, children with autism increased the number of questions they asked after a targeted question-asking intervention; these children also showed vocabulary gains after improving in this pivotal area (Koegel, Camarata, Valdez-Menchaca, & Koegel, 1998).

Cognitive/academic. Koegel, Harrower, and Koegel (1999) have reported support for the use of PRT techniques in the classroom. Children with autism in full inclusion kindergarten classrooms were taught a behavioral self-management program to monitor their own classroom behavior. Results illustrated that students who used self-management increased their amount of time spent engaged in classroom activities assigned by their teachers and decreased their disruptive behavior. These results were maintained after prompts were removed and after the self-management system was no longer monitored, approximately one month after intervention had begun. Another technique discussed in the literature is "priming," or the previewing of content or activities. Koegel and colleagues (2003) used priming to address the academic performance and behavior of two children with autism (ages 5 and 15). Priming sessions occurred either at the child's home in the evening or during a free period at school, and sessions were used to prepare students for upcoming class activities. Results indicated that students' academic responding increased and problematic behavior decreased.

Conclusions. PRT is a form of applied behavior analysis with high potential for usefulness in school settings. Because of the naturalistic element of this treatment approach, PRT is conducive to inclusive school settings in which intervention can be delivered by a number of professionals across settings throughout the school day. PRT, like other treatment approaches, requires treatment fidelity for successful implementation. Thus, parents, educators, and other intervention specialists should be adequately trained prior to treatment implementation. Future research efforts, including more long-term outcome data, may help further delineate specific training models for using PRT in the classroom.

Learning Experience: An Alternative Program for Preschoolers and Parents

Learning Experience: An Alternative Program for Preschoolers and Parents (LEAP) is an early intervention approach developed by Strain and colleagues (1998) at the University of Colorado at Denver. LEAP serves preschoolers with autism in inclusive preschool settings, and the program involves training teachers, parents, and peers. The LEAP program promotes inclusion and is based on a foundation of recognizing the importance of scaffolded observational learning opportunities (Kohler, Strain, & Goldstein, 2000). Additional key features of LEAP include individualized and creative curricula, data-driven implementation, a focus on generalization of skills across contexts, efforts to maximize students' opportunities to respond, and a focus on teaching families skills (Strain & Hoyson, 2000).

The intervention consists of a variety of strategies to encourage social interactions between children with autism and their typically developing classmates in an inclusive preschool setting (Strain, Danko, & Lawry, 1998). The Social Skills Curriculum involves peer mediated strategies and trains peers in the following skills: getting friends' attention, sharing, requesting items (e.g., toys), organizing play, and giving compliments. Peers are taught to use facilitative strategies and subsequently given teacher prompts and reinforcement

for using the strategies while playing with their classmates with autism (Strain, Kohler, & Goldstein, 1996). Detailed materials such as check lists, information on classroom techniques, teacher prompts, curriculum guides, suggestions for classroom arrangements, teaching methods, play activities (e.g., art, drama, motor activities), suggestions for incorporating techniques into daily routines, and suggestions for collecting data on social skills can be found in the Social Skills Training Packet (Strain et al., 1998) developed by the LEAP Outreach Project.

LEAP Outcome Data

Communication/language. Preschoolers with developmental delays demonstrated increased rates of communicative interaction with their typically developing peers after participating in an inclusive preschool setting in which peers had been trained in strategies of communication facilitation (Goldstein & Ferrell, 1987; Goldstein & Wickstrom, 1986). A noteworthy highlight of this finding is that increases were found in response rates specifically regarding relevant on-topic verbal responses. These results were found after the implementation of teacher prompting, and results were maintained after prompts were faded.

Social/play. Strain and colleagues (1996) report that the research shows typically developing peers as young as 36 months are able to engage socially withdrawn peers when given proper instruction. In addition, typical peers may benefit socially from being intervention agents, or at a minimum experience no negative outcomes from learning to facilitate social interactions with children with autism. Strain and Hoyson (2000) studied six children (ages 3 to 5 years old) enrolled in a LEAP program who initially scored in the moderate to severe range of autism according to the Childhood Autism Rating Scale (CARS; Schopler, Reichler, & Renner, 1988). After two years of LEAP intervention, the level of participants' positive social interactions increased by approximately eight times in comparison to entry levels; these gains were also found at follow-up when participants were 10 years old (Strain & Hoyson, 2000). The post-LEAP levels of social interactions were comparable to those of the students' typically developing peers. Students also demonstrated large gains in "child appropriate behavior" with family members (e.g., reductions in noncompliance) after the two year LEAP program and at age 10. Additionally, parent ratings indicating changes in child behavior from "very unacceptable" initially to "very acceptable" post-LEAP provide data on the social validity of these findings.

Cognitive/academic. Strain and Hoyson (2000) found that five of their six LEAP participants were enrolled in general education classrooms without the need for special education services as they continued on to elementary school after the LEAP program. After completing two years in the intensive, comprehensive LEAP program, students no longer scored within the autism classification range on the CARS. This improvement on the CARS was maintained at age 10. "Substantial gains" in developmental functioning were found at LEAP exit and at age 10. However, the authors note that the use of different assessment tools created a methodological confound for this finding.

Conclusions. LEAP is a treatment approach for preschoolers with autism that is based on behavioral concepts and peer-mediated intervention techniques. This intervention approach incorporates typically developing peers and is well-suited for an inclusive school setting. Students with autism may benefit from enrollment in a LEAP program during their preschool years. Parents and educators should be aware that the empirical basis for LEAP is currently limited to intervention for preschool-aged children with autism.

PROMISING PRACTICE

The following three intervention strategies (i.e., PECS, incidental teaching, and TEACCH) are presented under the category of promising practice (Simpson, 2005). These approaches have emerged with a degree of efficacy and utility, although additional verification in the literature is needed to enhance their evidence base. School psychologists should weigh individual student considerations as well as social validity before considering implementing these types of interventions. Readers are directed to Simpson (2005) for a more extensive list of promising practices.

Picture Exchange Communication System

The Picture Exchange Communication System (PECS) is a systematic program based on the teaching techniques/principles of applied behavior analysis that provide children who have delayed verbal skills with an augmentative communication system (NRC, 2001; Schwartz, Garfinkle, & Bauer, 1998). PECS focuses on teaching children to initiate requests by exchanging pictures for desired objects and activities (e.g., toys, food, attention). The protocol includes six phases in which the child ultimately learns to exchange multiple pictures arranged in a sentence to communicate a request or comment across a variety of communicative partners, activities, and settings (Bondy & Frost, 1994). It should be noted that PECS is an augmentative communication system – not an alternative communication system – designed to eventually augment speech (not necessarily as an alternative to speech training).

Specifically, the first two phases utilize two trainers, a communicative partner and a prompter, to teach the student to initiate a request by exchanging a picture/symbol icon for a desired item. Practicing this basic request enables the student to learn the value of the icon and establishes the skills needed for future communication. The third phase focuses on discrimination training in which the student learns to achieve symbol-object correspondence. Using the teaching techniques of this phase, the trainer focuses on expanding the student's picture vocabulary. In phase four, the student learns to create and exchange a complete sentence by adding an "I want" icon. Additionally, the student is encouraged to verbally label the requested item. Expanding upon the fourth phase, phase five focuses on teaching the student to respond to the question "What do you want?" Finally, phase six consists of teaching the student to comment by responding to questions such as "What do you see?" and "What do you hear?"

PECS Outcome Data

Communication/language. In 1994, Bondy and Frost examined the communicative outcomes of 66 children receiving PECS training. This case review showed that following a two-year period, 59% of the children acquired independent speech, 30% used speech with PECS, and 11% used PECS only. The study also reports that the development of speech began after the children acquired 30-100 symbols and that independent speech was only observed after the children received PECS for at least one year. Furthermore, communicative outcomes were reportedly related to the children's level of cognitive functioning (Bondy & Frost, 1994; NRC, 2001). A second study conducted by Schwartz and colleagues (1998), reported the communicative outcomes of 18 children following a 14-month period of PECS training. The results indicated that 44% of the children demonstrated an increase in spontaneous speech, and all participants learned to use PECS functionally with adults and peers.

Similarly, Ganz and Simpson (2004) documented the increase in verbal speech among three young children following a mastery of the third and fourth phases of PECS. Each of the three children demonstrated improvements in the number of intelligible words, as well as in the length and complexity of spoken utterances.

Social/play. Charlop-Christy and colleagues (2002) investigated the acquisition of PECS and speech, as well as the ancillary gains concerning social-communicative and disruptive behaviors in three children with autism (Charlop-Christy, Carpenter, Le, LeBlanc & Kellet, 2002). Using a single-case experimental design, data were collected during pre-training, training, and post training sessions across academic and free play activities. One of the participants was evaluated again at a 10-month follow-up period. The results indicated that all three participants demonstrated mastery across the six PECS phases and made gains in imitative speech, spontaneous requests, and in mean length of utterance (MLU). Additionally, decreases in disruptive behavior as well as collateral improvements in behaviors such as joint attention, eye contact, and toy play were observed.

Conclusions. Conclusions. PECS appears to be a promising intervention approach for providing children with autism an augmentative system for communicating, particularly for those who have not yet begun demonstrating expressive language skills. While several studies have shown that children with autism can learn to utilize this system with both adults and peers, further research is needed in order to determine the effects PECS has on social, cognitive, and academic functioning, particularly in the inclusive school setting. Additionally, research has reported that picture systems can be quite cumbersome for families to implement

(Stiebel, 1999); thus, home-school coordination is recommended in order to solicit parent input and assess goodness-of-fit prior to beginning the treatment.

Incidental Teaching

The Walden Toddler Model was developed in 1993 as a comprehensive incidental teaching approach that combines home- and center-based early intervention services for children with autism, ages 15 to 30 months (McGee, Morrier, & Daly, 1999). Emphases of the Walden program or program replications include early intervention, family involvement, an inclusive center-based program with a ratio of 2:1 (between typically developing peers and children with autism), an intensive number of intervention hours (approximately 30-50 hours per week, including both center and home services), the use of incidental teaching procedures, and the absence of aversive procedures.

McGee and colleagues (1999) describe toddler goals for program participants in the areas of verbal expressive language, engagement with toys, social responsiveness to adults, social tolerance/limitation of peers, and independent living skills. Classroom environments are arranged such that "zones" are created to afford structured learning opportunities of particular skills. Students also receive one-to-one instruction on skills to provide supplementary learning opportunities in addition to the classroom incidental learning opportunities.

The incidental teaching methods used to help toddlers with autism reach intervention goals share characteristics with methods used in PRT. Teachers strive to elicit child initiations through the use of environmental arrangements (e.g., a desired toy on a high shelf or a desired play area behind a gate) and reinforce the child's initiation by confirming what the child has correctly done, praising the child, and providing access to the desired toy (McGee et al., 1999). Incidental teaching involves finding teachable moments in the natural context of ongoing activities.

Incidental Teaching Outcome Data

Communication/language. Almost four decades ago, Hart and Risley (1968) found incidental teaching to be associated with gains in language development for typically developing preschoolers. In more recent years, similar gains have been found for children with autism. An evaluation study of toddlers with autism who had been in the Walden Toddler Program for at least six months demonstrated that while 36% of toddlers demonstrated verbalizations at program entry, 82% were verbalizing meaningful words at program exit (McGee et al., 1999). McGee and colleagues also noted improvement in quality of verbalizations, given that program entry verbalizations tended to be echolalic or perseverative speech. The majority of toddlers with autism in this study exited the program with functional speech.

In addition to studies at the toddler level, scholars have examined the use of incidental teaching for school-aged children. In a study of students with autism and/or mental retardation, Haring and colleagues (1987) found that employing incidental teaching procedures allowed teachers to increase the number of opportunities they provided for students to communicate, and students also demonstrated higher levels of communicative responses. Studies have also shown associations between incidental teaching and gains in receptive language skills (McGee, Krantz, Mason, & McClannahan, 1983) and preposition use (McGee, Krantz, & McClannahan, 1985) for school-aged children with autism. These studies also demonstrated generalization of communicative gains.

Social/play. Social progress was also considered in the study conducted by McGee and colleagues (1999). By the end of the incidental teaching program, 96% of toddlers with autism demonstrated either improvement in the amount of time they spent in close proximity to peers or maintained levels of peer proximity comparable to those of their typical peer counterparts. McGee and colleagues (1992) demonstrated that preschoolers with autism displayed increases in reciprocal peer interactions after having peer tutors trained in incidental teaching methods. Teacher ratings of social competence and peer sociometric ratings also increased after treatment.

Cognitive/academic. Incidental teaching procedures for children with autism have also been

demonstrated to produce gains in sight-word identification skills (McGee, Krantz, & McClannahan, 1986) and spontaneous use of color adjectives (Miranda-Linne & Melin, 1992). Interestingly, Miranda-Linne and Melin (1992) found that the DTT method initially produced faster acquisition and greater classroom-to-home generalization gains; however, the incidental teaching methods were found to be associated with greater generalization at follow-up. Incidental teaching may produce more robust long term learning gains, although other methods like DTT might appear more efficacious in the short term. This finding may have implications for the selection of school-based intervention programs.

Conclusions. Similar to PRT and the LEAP model, incidental teaching is conducted in the natural inclusive environment and utilizes typical peer models. Additionally, this approach has produced numerous studies demonstrating positive outcomes. Given that much of the research has been focused on younger and more severe populations, future research could reveal the potential value of incidental teaching procedures for older children and those with high-functioning autism and Asperger Syndrome.

Treatment and Education of Autistic and Related Communication Handicapped Children

The Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH) began as a university-based project seeking to improve services to children with autism spectrum disorders (ASD) and has since transformed into a comprehensive program of services across home, school, and community domains (Schopler, 1994). TEACCH maintains a focus on structured classroom teaching and skill enhancement to help children with autism succeed at school (Schopler, 1994). Additional treatment principles include focusing on improved adaptation, collaboration with parents, community advocacy, cognitive and behavior therapy, individualization of treatment, and a generalist training model.

Structured teaching. Structured teaching is geared toward capitalizing upon perceived relative strengths of students with autism in visual processing, thus minimizing potential deleterious effects on learning from deficits in areas such as auditory processing (Schopler, Mesibov, & Hearsey, 1995). Structured teaching aims to help reduce problem behavior and increase adaptation/independent functioning (Schopler et al., 1995). The four main components of structured teaching are physical organization, schedules, individual work systems, and task organization (Schopler et al., 1995).

Physical organization involves elements such as clear boundaries between activity areas in the classroom, specified transition areas, and physical organization of desks to support attention and/or auditory processing challenges for students with autism (Schopler et al., 1995). As adaptive functioning improves, physical structure interventions may be faded (Schopler et al., 1995). Schedules consisting of physical objects, pictures, or words – depending upon students' unique developmental level and needs – can help minimize problems of attention, memory, time, organization, and receptive language, as well as helping to foster independence and self-motivation (Schopler et al., 1995). Work systems can help students with autism work independently by visually and systematically indicating what work is to be done, how much work is to be done, and when the work is finished (Schopler et al., 1995). Depending upon developmental level, work systems may have low symbolic complexity (e.g., using actual objects) or higher levels of symbolic complexity (e.g., using color coding, pictures, numbers, or words) (Schopler et al., 1995). Finally, attention is paid to task organization to help clarify tasks and teach students patterns of work (e.g., sorting crayons by color and name, sorting light and dark laundry, or going through steps of a recipe) (Schopler et al., 1995). Task organization also should be approached according to developmental level.

Skill enhancement. Additional intervention strategies of the TEACCH model include providing directions, offering prompts, and giving reinforcers. Providing clear verbal directions for tasks using minimal language can help students with ASD accomplish task completion (Schopler et al., 1995). Clear and timely teacher prompts can be helpful in teaching students acquisition tasks, bearing in mind that prompt-dependency in students may necessitate thoughtful placement of the teacher (i.e., behind or beside the student) (Schopler et al., 1995). External reinforcement can sometimes be an effective tool, especially when the reinforcer involves something very motivating for the student (Schopler et al., 1995).

TEACCH Outcome Data

Social/play. Van Bourgondien and colleagues (2003) found some support for using TEACCH methods in residential program treatment for adolescents and adults with both moderate to severe autism and mental retardation. TEACCH methods were associated with higher family satisfaction and decreases in behavior difficulties. However, TEACCH methods were not associated with an increase in acquisition of skills.

Cognitive/academic. Studies examining outcomes associated with home-based treatment (Ozonoff & Cathcart, 1998) and residential program treatment (Van Bourgondien, Reichle, & Schopler, 2003) have provided some support for the TEACCH model. In a quasi-experimental study conducted by Ozonoff & Cathcart (1998), home-based treatment focusing on training parents in TEACCH methods was associated with significant gains in cognitive and developmental skills such as imitation, motor skills, and cognitive performance. However, participating children did not score significantly higher after intervention than the control group on perception and a cognitive verbal test. A study using the TEACCH model in Italian schools found that students with autism and mental retardation improved in scores on imitation, perception, gross motor skills, hand-eye coordination, and cognitive performance when using the TEACCH model versus the control group, which improved only in hand-eye coordination (Panerai, Ferrante, & Zingale, 2002). A recent single-subject design study of 6 and 7 year-old low-functioning students with autism, as well as a 20 year-old, demonstrated gains and maintenance of on-task behavior and work completion after implementing a work system intervention (Hume & Odom, 2007).

Conclusions. TEACCH is a school-based program for students with autism that has existed for decades, and research on TEACCH has evidenced some positive outcomes for children with low-functioning autism. While TEACCH is well disseminated, particularly within special education classrooms and group homes, there appears to be limited empirical study of the approach. Additionally, its applicability to the natural, inclusive school environment is unclear. Critics of the research base for TEACCH have pointed out the limited classroom research as well as lack of adequate control for threats to internal and external validity (Gresham, Beebe-Frankenberger, & MacMillan, 1999).

CONCLUSIONS

Three scientifically based practices and several promising practices have been briefly described to provide information that will help school psychologists bring research to practice through informed selection of school-based interventions for children with autism. It should be noted that Simpson (2005) organizes interventions into the following categories: skill-based, cognitive, physiological/biological/neurological, interpersonal, and other. The majority of intervention strategies presented in this manuscript are skill-based in nature, with the exception of LEAP as a cognitive based intervention. Several additional "promising practice" interventions involve cognitive techniques and assistive technology. This manuscript does not provide information on intervention strategies with limited research support or strategies that are not recommended, but school psychologists should be knowledgeable of such interventions in order to support parents and other educators in their informed decision-making process on multidisciplinary teams for students with autism. School psychologists are also encouraged to seek out information and learn more about any scientifically based or promising practice in the field of autism interventions before implementing these techniques.

There are numerous important considerations to take into account when developing a comprehensive intervention plan for a child with autism. First, and perhaps foremost, intervention strategies should have a scientific basis suggesting that the particular interventions are like ly to benefit students under consideration. Although scholars may argue what constitutes scientific evidence, it is suggested that a variety of research designs including single-subject studies are appropriate methods for autism intervention research at this point in the development of the literature base (Simpson, 2005). Second, student-specific information must be addressed in order to allow intervention to be informed by assessment covering multiple domains of functioning. While some interventions have more documented support, there is no silver bullet intervention to use for all children with autism. Individual student considerations, as well as local contexts, strengths, and resources, must be incorporated into intervention plans for students with autism. Finally, students with

autism must receive intervention in the natural environment and be included with their typical peers. In fact, many of the top researchers in the field attribute the success of interventions to this contextual component and view segregated, autism-only environments as "developmentally toxic" (Strain, 2001, p. 31).

ADDITIONAL CONSIDERATIONS

As with any child with special needs, developmental appropriateness must be taken into consideration when developing intervention plans for students with autism. Understanding the developmental history of the child, the current developmental patterns, and the child's chronological age informs the identification of appropriate interventions that may meet the needs of the child and the family. Some intervention options may not be appropriate for specific children since they may not possess the requisite skills, and research conducted with a population of a particular developmental level should not be overgeneralized to inform intervention for children of different developmental levels.

Family involvement is also an important component of a child's treatment program. Each family member is impacted when a child has autism. Frequently, daily routines and habits must be modified to fit the needs of the child. Although the family must make some adjustments to their routine, clinicians must respect the family structure and beliefs. It is important to develop treatment procedures that fit within the family's daily routines. By doing this, there is less disruption to the family's life and the family is more likely to continue to implement the intervention plan. It is optimal to implement interventions within the family's routine in a natural context. Parents and other service providers who work with the student outside of the school can help improve the child's performance during school. For example, parents can assist their child with homework to encourage appropriate academic responding, which may increase the child's academic success (Koegel, Koegel, Frea, & Green-Hopkins, 2003).

Cultural beliefs are also important to consider when developing an intervention plan. Families of various cultural backgrounds may not place as much emphasis on a child's developmental milestones as other families. For instance, a family might be more concerned with their child's ability to sit for long periods of time, rather than make eye contact. It is important to understand the parents' beliefs and daily routines in order to develop a comprehensive intervention plan that is likely to be effective and useful for both the child and the family.

In Sum

School psychologists and other educational professionals can provide valuable information to parents through discussing the various available intervention approaches to facilitate the social and cognitive competence of children with autism. Optimal intervention strategies will vary depending on the child's specific strengths and challenges, the goals of parents, and the home and school contexts. School psychologists may facilitate communication and collaboration with parents and other professionals who may be involved in helping a child with autism. Given the diverse array of challenges faced by children with autism, empirically based intervention strategies should be tailored to the individual child's specific needs and goals. School psychologists are also capable of providing informative assessments of the child's skills (e.g., communication and social interaction) and the presence of stereotyped behaviors or restricted interests. Overall, an optimal treatment strategy for autism will examine the results of a comprehensive assessment and include a behavioral and psychoeducational treatment plan based on the child's specific needs, whether predominant goals include developing functional communication skills, improving social/play skills, or increasing positive behaviors.

REFERENCES

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: American Psychiatric Association.

Anderson, S.R., Avery, D.L., DiPietro, E.K., Edwards, G.L., & Christian, W.P. (1987). Intensive home-based

early intervention with autistic children. *Education and Treatment of Children, 10*, 352-366.

Baker-Ericzen, M. J., Stahmer, A. C., & Burns, A. (2007). Child demographics associated with outcomes in a community-based pivotal response training program. *Journal of Positive Behavior Interventions, 9*, 52-60.

Birnbrauer, J.S., & Leach, D.J. (1993). The Murdoch Early Intervention Program after 2 years. *Behaviour Change, 10*, 63-74.

Bondy, A. S., & Frost, L. A. (1994). The picture exchange communication system. *Focus on Autistic Behavior, 9*, 1-19.

Bondy, A. S., & Frost, L. A. (2001). The picture exchange communication system. *Behaviour Modification, 25*, 725-744.

Brock, S., Jimerson, S., & Hansen, R. (2006). *Identifying, Assessing, and Treating Autism at School.* New York: Springer.

Charlop-Christy, M. H., Carpenter, M., Le, L., LeBlanc, L. A., & Kellet, K. (2002). Using the Picture Exchange Communication System (PECS) with children with autism: Assessment of PECS acquisition, speech, social-communicative behavior, and problem behavior. *Journal of Applied Behavior Analysis, 35*, 213-231.

Cohen, H., Amerine-Dickens, M., & Smith, T. (2006). Early intensive behavioral treatment: Replication of the UCLA model in a community setting. *Developmental and Behavioral Pediatrics, 27*, 145-155.

Fombonne, E. (2003). Epidemiology of pervasive developmental disorders. Trends in Evidence-Based *Neuropsychiatry, 5*, 29-36.

Fombonne, E. (2005) The changing epidemiology of autism. *Journal of Applied Research in Intellectual Disabilities, 18*, 281-294.

Ganz, J. B., & Simpson, R. L. (2004). Effects on communicative requesting and speech development of the picture exchange communication system in children with characteristics of autism. *Journal of Autism and Developmental Disorders, 34*, 395-409.

Goldstein, H., & Ferrell, D. R. (1987). Augmenting communicative interaction between handicapped and nonhandicapped preschool children. *Journal of Speech and Hearing Disorders, 52*, 200-211.

Goldstein, H., & Wickstrom, S. (1986). Peer intervention effects on communicative interaction among handicapped and nonhandipcapped preschoolers. *Journal of Applied Behavior Analysis, 19*, 209-214.

Gresham, F. M., Beebe-Frankenberger, M. E., & MacMillan, D. L. (1999). A selective review of treatments for children with autism: Description and methodological considerations. *School Psychology Review, 28*, 559-575.

Gresham, F.M., & MacMillan, D.L. (1997). Autistic recovery? An analysis and critique of the empirically evidence on the Early Intervention Project. *Behavioral Disorders, 22*, 185-201.

Gresham, F.M., & MacMillan, D.L. (1998). Early intervention project: Can its claims be substantiated and its effects replicated? *Journal of Autism and Developmental Disorders, 28*, 5-12.

Haring, T. G., Neetz, J. A., Lovinger, L., Peck, C., & Semmel, M. I. (1987). Effects of four modified incidental teaching procedures to create opportunities for communication. *JASH, 12*(3), 218-226.

Hart, B., & Risley, T. R. (1968). Establishing the use of descriptive adjectives in the spontaneous speech of disadvantaged preschool children. *Journal of Applied Behavior Analysis, 1*, 109-120.

Howard, J. S., Sparkman, C. R., Cohen, H. G., Green, G., & Stanislaw, H. (2005). A comparison of intensive behavior analytic and eclectic treatments for young children with autism. *Research in Developmental Disabilities, 26*, 359-383.

Hume, K., & Odom, S. (2007). Effects of an individual work system on the independent functioning of students with autism. *Journal of Autism and Developmental Disorders, 37*, 1166-1180.

Iovannone, R., Dunlap, G., Huber, H., & Kincaid, D. (2003). Effective educational practices for students with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 18*, 150-165.

Koegel, L. K., Camarata, S. M., Valdez-Menchaca, M., & Koegel, R. L. (1998). Setting generalization of question-asking by children with autism. *American Journal on Mental Retardation, 102*, 346-357.

Koegel, L K., Harrower, J. K., & Koegel., R. L. (1999). Support for children with developmental disabilities in full inclusion classrooms through self-management. *Journal of Positive Behavior Interventions, 1*, 26-34.

Koegel R. L. & Koegel L. K. (Eds.) (2006). *Pivotal response treatments for autism: Communication, social,*

& academic development. Baltimore, MD: Paul H. Brookes.

Koegel, L. K., Koegel, R. L., Frea, W., & Green-Hopkins, I. (2003). Priming as a method of coordinating educational services for students with autism. *Language, Speech and Hearing Services in Schools, 34*, 228-235.

Koegel, L. K. Koegel, R. L., Harrower, J. K. & Carter, C. M. (1999). *Pivotal response intervention I: Overview of approach. Journal of the Association for Persons with Severe Handicaps, 24*, 174-185.

Koegel, L. K. Koegel, R. L., Shoshan, Y., & McNerney, E. (1999). Pivotal response intervention II: Preliminary long-term outcomes data. *Journal of the Association for Persons with Severe Handicaps, 24*, 186-198.

Koegel, R. L., Koegel, L. K., & Carter, C. M. (1999). Pivotal teaching interactions for children with autism. *School Psychology Review, 28*, 576-594.

Koegel, R. L., Koegel, L. K., & Surratt, A. (1992). Language intervention and disruptive behavior in preschool children with autism. *Journal of Autism and Developmental Disorders, 22*, 141-153.

Koegel, R. L., Openden, D., Fredeen, R. M., & Koegel, L. K. (2006). The basics of pivotal response treatment. In R. L. Koegel & L. K. Koegel (Eds.), *Pivotal response treatments for autism: Communication, social, & academic development* (pp. 3-30). Baltimore, MD: Paul H. Brookes.

Kohler, F. W., Strain, P. S., & Goldstein, H. (2000). Learning experiences…an alternative program: Peer-mediated interventions for young children with autism. In E. D. Hibbs & P. Jensen (Eds.), *Psychosocial treatments for child and adolescent disorders: Empirically based strategies for clinical practice*, 2nd edition (pp. 659-687). Washington, DC: American Psychological Association.

Lovaas, O.I. (1977). *The autistic child: Language development through behavior modification*. New York: Irvington.

Lovaas, O.I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology, 55*, 3-9.

Lovaas, O.I., Koegel, R.L, Simmons, J.Q., & Long, J.S. (1973). Some generalization and follow-up measures on autistic children in behavior therapy. *Journal of Applied Behavior Analysis, 6*, 131-166.

Lovaas, O. I., Schreibman, L., Koegel, R., & Rehm, R. (1971). Selective responding by autistic children to multiple sensory input. *Journal of Abnormal Psychology, 77*(3), 211-222.

Lovaas, O.I., & Smith, T. (2003). Early and intensive behavioral intervention in autism. In A.E. Kazdin & J.R. Weisz (Eds.), *Evidence-based psychotherapies for children and adolescents* (pp. 325-340). New York: The Guilford Press.

McGee, G., Almeida, M. C., Sulzer-Azaroff, B. & Feldman, R. S. (1992). Promoting reciprocal interactions via peer incidental teaching. *Journal of Applied Behavior Analysis, 25*, 117-126.

McGee, G. G., Krantz, P. J., Mason, D. & McClannahan, L. E. (1983). A modified incidental-teaching procedure for autistic youth: Acquisition and generalization of receptive object labels. *Journal of Applied Behavior Analysis, 16*, 329-338.

McGee, G. G., Krantz, P. J. & McClannahan, L. E. (1985). The facilitative effects of incidental teaching on preposition use by autistic children. *Journal of Applied Behavior Analysis, 18*, 17-31.

McGee, G. G., Krantz, P. J. & McClannahan, L. E. (1986). An extension of incidental teaching procedures to reading instruction for autistic children. *Journal of Applied Behavior Analysis, 19*, 147-157.

McGee, C. G., Morrier, M. J., & Daly, T. (1999). An incidental teaching approach to early intervention for toddlers with autism. *The Journal of the Association for Persons with Severe Handicaps, 24*(3), 133-146.

McEachin, J.J., Smith, T., & Lovaas, O.I. (1993). Long-term outcome for children with autism who received early intensive behavioral treatment. *American Journal on Mental Retardation, 4*, 359-372.

Miranda-Linne, R. & Melin, L. (1992). Acquisition, generalization, and spontaneous use of color adjectives: A comparison of incidental teaching and traditional discrete-trial procedures for children with autism. *Research in Developmental Disabilities, 13*, 191-210.

National Research Council (2001). Educating Children with Autism. Committee on Educational Interventions for Children with Autism. Catherine Lord and James P. McGee, eds. *Division of Behavioral and Social Sciences and Education*. Washington, DC: National Academy Press.

Ozonoff, S., & Cathcart, K. (1998). Effectiveness of a home program intervention for young children with autism. *Journal of Autism and Developmental Disorders, 28*, 25-32.

Panerai, S., Ferrante, L., & Zingale, M. (2002). Benefits of the Treatment and Education of Autistic and Communication Handicapped Children (TEACCH) programme as compared with a non-specific approach. *Journal of Intellectual Disability Research, 46*, 318-327.

Pierce, K., & Schreibman, L. (1995). Increasing complex social behaviors in children with autism: Effects of peer-implemented pivotal response training. *Journal of Applied Behavior Analysis, 28*, 285-295.

Pierce, K., & Schreibman, L. (1997). Multiple peer use of pivotal response training to increase social behaviors of classmates with autism: Results from trained and untrained peers. *Journal of Applied Behavior Analysis, 30*(1), 157-160.

Schopler, E. (1994). Behavioral priorities for autism and related developmental disorders. In Schopler, E., & Mesibov, G. B. (Eds.), *Behavioral Issues in Autism*. New York: Plenum Press.

Schopler, E., Mesibov, G. B., & Hearsey, K. (1995). Structured teaching in the TEACCH system. In E. Schopler & G. B. Mesibov (Eds.), *Learning and cognition in autism* (pp. 243-268). New York: Plenum Press.

Schopler, Reichler, & Renner. (1988). *The childhood autism rating scale* (CARS). Los Angeles: Western Psychological Services.

Schwartz, I., Garfinkle, A. N., & Bauer, J. (1998). The Picture Exchange Communication System: Communicative outcomes for young children with disabilities. *Topics in Early Childhood Special Education, 18*(3), 144-159.

Sheinkopf, S.J., & Seigel, B. (1998). Home-based behavioral treatment of young children with autism. *Journal of Autism and Developmental Disabilities, 28*, 15-23.

Simpson, R. L. (2005). Evidence-based practices and students with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 20*(3), 140-149.

Smith, T., Eikeseth, S., Klevstrand, M., & Lovaas, O. I. (1997). Intensive behavioral treatment for preschoolers with severe mental retardation and pervasive developmental disorder. *American Journal on Mental Retardation, 102*, 238-249.

Smith, T., Donohoe, P.A., & Davis., B.J. (2001). The UCLA Young Autism Project. In. J.S. Handleman & S.L. Harris (Eds.), *Preschool Education Programs for Children with Autism* (pp. 29-48). Austin: Pro-ed.

Smith, T., Groen, A.D., & Wynn, J.W. (2000). A randomized trial of intensive early intervention for children with pervasive developmental disorder. *American Journal of Mental Retardation, 5*, 269-285.

Steege, M. W., Mace, F. C., Perry, L. & Longenecker, H. (2007). Applied behavior analysis: Beyond discrete trial teaching. *Psychology in the Schools, 44*, 91-99.

Stiebel, D. (1999). Promoting augmentative communication during daily routines: A parent problem-solving intervention. *Journal of Positive Behavior Interventions, 1*, 159-169.

Strain, P.S. (2001). Empirically based social skill intervention: A case for quality-of-life improvement. *Behavioral Disorders ,27*(1), 30-36.

Strain, Danko, & Lawry (1998). *Social skills classroom training packet.* LEAP Outreach Project, Center for Collaborative Educational Leadership, University of Colorado at Denver.

Strain, P. S., Kohler, F. W., & Goldstein, H. (1996). *Learning experiences…an alternative program: Peer-mediated interventions for young children with autism*. In P. Jensen & T. Hibbs (Eds.), Psychosocial treatments of child and adolescent disorders (pp. 573-587). Bethesda, MD: National Institutes of Health.

Strain, P. S., & Hoyson, M. (2000). *The need for longitudinal, intensive social skill intervention: LEAP follow-up outcomes for children with autism.* TECSE, 20(2), 116-122.

Tidmarsh, L., & Volkmar, F. (2003). Diagnosis and epidemiology of autism spectrum disorders. *Canadian Journal of Psychiatry, 48*(8), 517-525.

Van Bourgondien, M. E., Reichle, N. C., & Schopler, E. (2003). Effects of a model treatment approach on adults with autism. *Journal of Autism and Developmental Disorders, 33*, 131-140.

Williams, S. K., Johnson, C., & Sukhodolsky, D. G. (2005). The role of the school psychologist in the inclusive education of school-aged children with autism spectrum disorders. *Journal of School Psychology, 43*, 117-136.